Original Article

Physical-healthy and psychosocial differences in school children: A study of gender

GABRIEL GONZÁLEZ-VALERO[1], SILVIA SAN ROMÁN-MATA[2], JOSÉ LUIS UBAGO-JIMÉNEZ[1], PILAR PUERTAS-MOLERO[1]

[1]*Department of Didactics of Musical, Plastic and Corporal Expression, University of Granada, Granada, Spain*
[2]*Department of Nursing, University of Melilla, Melilla, Spain*

ABSTRACT

This study aims to examine gender differences according to physical-healthy habits, problematic use of video games and self-concept in Primary Education students in Granada. In this descriptive and cross-sectional study, 577 primary school students in Granada participated. The Questionnaire of Mediterranean Diet Quality Index (KIDMED) was used for the Mediterranean diet adherence variable, the Questionnaire of Experiences Related to Video Games (QERV) was applied to the problematic use of video games, and the self-concept, Five-Factor Self-Concept Questionnaire (AF-5) was used. In addition, the Body Mass Index (BMI) was measured and a self-registration sheet was used to record the age and gender of the individuals, daily hours of physical activity, hours of using digital screens and hours of sleeping. Main results and conclusions of the study, it should be noted that men have higher levels of regular physical activity, problematic use of video games, adherence to the Mediterranean diet and physical and family self-concept. While females show higher levels of body mass index and academic, social and emotional self-concept. Males showed that greater participation in physical-sports activities was associated with better adherence to the Mediterranean diet, levels of self-concept and fewer hours of sleep. In this sense, it should be noted that the females showed that the greater the practice of physical activity the lower the family self-concept. In addition, it was found that, in general, an adequate intake of the Mediterranean diet favours self-concept, while when this is low, the use of problematic video games is encouraged.

Keywords: Self-concept; Video games; Physical-healthy habits; School children; Gender.

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Corresponding author. *Department of Didactics of Musical, Plastic and Corporal Expression. University of Granada. Campus de Cartuja, s/n 18071. Granada, Spain.*
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INTRODUCTION

For a few years now, overweight and obesity levels have continued to rise in developed countries (Kemps et al., 2020; Llabre et al., 2020; Vervoort, De Guchtenaere, Tanghe and Braet, 2020). These problems are determined by the dizzying changes that have taken place at the technological level, which has generated a greater predisposition in the young population to acquire sedentary habits, such as the excessive use of screen devices or the use of video games (González-Valero et al., 2017; Lozano-Sánchez, 2019).

These facts have put the practice of physical activity in the background, where few young people get the minimum number of hours of recommended weekly physical activity (Biagi-Batista et al., 2019; Klos, Feil, Eberhardt and Jekauc, 2020). In line with the above, the practice of regular physical activity is a fundamental component of healthy lifestyles, as it is responsible for multiple benefits at the physical, psychological, cognitive and social levels (Qi, Wang and Li, 2019; Robinson and Logan, 2017). In this sense, sleeping hours have also been modified, being this factor essential during childhood, since it favours the correct cognitive development (Keller, Haak, DeWall and Renzetti, 2019).

Digital leisure might be related to the type of diet one acquires, since as determined by Falbe et al. (2014), these factors constitute sedentary lifestyles, which are often associated with less healthy lifestyles and irregular diets. In this sense, diet is considered one of the main components that configure healthy lifestyles (Burja, Grotto, Brocadello, Sperotto and Baldo, 2020; Idelson, Scalfi and Valerio, 2017; San Román-Mata, 2019), which should be high in natural antioxidants, fish, nuts, cereals, olive oil and moderate in the consumption of red meat, eggs and fat (Idelson et al., 2017). It is of special interest to develop optimal eating habits at an early age, in order to enhance their development and prevent disease (Goni et al., 2018; Rios-Hernández, Alda, Farran-Codina, Ferreira-García and Izquierdo-Pulido, 2017).

In addition to increasing body mass index, the acquisition of a poor diet might also affect self-concept, which is understood as the set of beliefs one has about oneself (Brown and Cairney, 2020; Taniguchi and Dailey, 2020). An excessively fatty diet will cause weight gain and thus a negative belief in oneself. Similarly, Castro-Sánchez, Zurita-Ortega, García-Marmol and Chacón-Cuberos (2019) show that low adherence to the Mediterranean diet means lower academic performance, as well as higher levels of stress and with it the development of a negative emotional self-concept (González-Valero et al., 2017; Jaureguizar, Garaigordobil and Bernaras, 2018; Morales-Rodríguez, 2017).

Considering the multiple challenges and problems faced by young people today, this study aims to examine gender differences according to physical-healthy habits, problematic use of video games and self-concept in Primary Education students in Granada.

METHODS

Participants

In this descriptive and cross-sectional study, 577 primary school students in Granada participated. The sample was represented by 56.8% (n = 328) of males and 43.2% (n = 249) of females, aged between 11 and 12 years (M = 11.41 ± 0.482). The inclusion criteria of the present study were those of belonging to the third primary education stage of Granada city.

Variables and instruments

Questionnaire of Mediterranean Diet Quality Index (KIDMED)

Prepared by Serra-Majem et al. (2004) and composed of a total of 16 items of a dichotomous nature. Four items are assessed with a negative score in case they are answered in the affirmative (-1), while the remaining twelve are assessed in the positive (+1). The sum of the items was established between scores -4 and 12, categorized as low quality diet (≤3), needs improvement (4-7) and optimal quality (≥8). The scale showed an internal reliability of α = .865.

Questionnaire of Experiences Related to Video Games (QERV)
Its original version was validated by Chamarro et al. (2014) and it is composed of 17 items that are rated with a four-option Likert scale (1 "almost never" and 4 "almost always"). The summation and classification in terciles was done to categorize the variable into "no problem" (between 17 and 25 points), "potential problems" (between 26 and 38) and "severe problems" (between 39 and 68 points). The reliability of this obtained a coefficient of α = .871.

Five-Factor Self-Concept Questionnaire (AF-5)
This questionnaire was developed by García and Musitu (1999) and validated in various stages and contexts (García, Musitu and Veiga, 2006). It is composed of 30 items scored by means of a five-point Likert scale (1 "never" and 5 "always"). The sum of the items was established to determine the general self-concept, being grouped in five dimensions: Academic self-concept (items 1, 6, 11, 16, 21 and 26), social self-concept (items 2, 7, 12, 17, 22 and 27), emotional self-concept (items 3, 8, 13, 18, 23 and 28), family self-concept (items 4, 9, 14, 19, 24 and 29) and physical self-concept (items 5, 10, 15, 20, 25 and 30). In the original study a reliability of α = .810 was established, while for this one the internal reliability was α = .793.

Body Mass Index (BMI)
This variable was indirectly evaluated through weight and height values. The bioimpedance scale was used to record the weight and the Seca 206 tape measure was used for the height. The formula for recording BMI was applied and categorized using the percentiles provided in the enKind study (Serra-Majem et al., 2003).

Ad-hoc questionnaire
In this self-registration sheet, the age and gender of the individuals were recorded, as well as the daily hours of physical activity, hours of using digital screens and hours of sleeping.

Procedure
The collaboration of the primary education centres was requested, through the management team, by means of an information letter prepared by the Department of Didactics of Musical, Artistic and Corporal Expression from the Faculty of Educational Sciences of the University of Granada. The nature and objective of the research was specified and the justifying and legal permits were delivered. The informed consent of the participants' legal tutors was requested, including those who had completed the study. Data collection was carried out during school hours or under the supervision of the researchers and teachers of the centre, to ensure the correct application of the instruments and the resolution of questions. A total of 74 questionnaires that were not correctly completed were eliminated. The procedure applied was approved by the Research Ethics Committee of the University of Granada (Spain) and respected the ethical principles proposed in the Declaration of Helsinki, ensuring the anonymity and confidentiality of the data.

Statistical analysis
A descriptive analysis was conducted to determine the characteristics of the participants. Means were used for basic descriptives, while the Student T test was used to establish relationships between variables for independent samples and Pearson's bivariate correlations at the significance level of $p < .05$ and $p < .01$.

Normality and homogeneity of the sample were examined by Kolmogorov Smirnov's test. The magnitude of differences, effect size (ES), was obtained using Cohen's standardized measure d (Cohen, 1988), interpreted as null (0-0.19), low (0.20-0.49), moderate (0.50-0.79), or high (≥ 0.80). The 95% confidence interval (CI) was calculated for each effect size. Data were analysed using SPSS statistical software version 24.0 (IBM Corp, Armonk, NY, USA).

RESULTS

The following table shows the study variables according to the gender of the participants. Statistically significant data were found for all variables ($p < .05$) except HDS ($p = .273$). Males (M = 2.41 ± 0.749) showed higher mean values than females (M = 2.13 ± 0.785) in the HDPA (ES = 0.366), in contrast, girls showed higher levels of HDSU (M = 2.55 ± 0.803 VS M = 2.33 ± 0.730; ES = 0.289). For self-concept dimensions, females presented the highest average levels for ASC (M = 4.34 ± 0.515; ES = 0.203), SSC (M = 4.38 ± 0.561; ES = 0.377) and ESC (M = 3.54 ± 0.635; ES = 0.222), while males showed them in FSC (M = 4.69 ± 0.317; ES = 0.290) and PSC (M = 4.29 ± 0.535; ES = 0.515). With a significance level of $p = .000$, girls (M = 18.46 ± 2.654) are observed to have higher BMI levels than boys (M = 17.80 ± 2.158), although males showed higher average values for MDA (M = 28.55 ± 2.037; ES = 0.428) and PUVG (M = 22.58 ± 6.909; ES = 0.274).

Table 1. Study variables according to the gender of the participants.

Variables	Gender						T-Test Sig. (bilateral)	ES (d)	95% CI
	Male		Female		Levene-Test				
	M	SD	M	SD	F	Sig.			
HDPA	2.41	0.749	2.13	0.785	2.030	.863	.016	0.366	[0.200; 0.532]
HDSU	2.33	0.730	2.55	0.803	2.487	.115	.001	0.289	[0.123; 0.454]
HDS	10.19	0.574	10.14	0.600	2.361	.125	.273	0.085	[-0.079; 0.250]
ASC	4.24	0.476	4.34	0.515	1.690	.484	.020	0.203	[0.038; 0.368]
SSC	4.16	0.600	4.38	0.561	2.619	.106	.008	0.377	[0.211; 0.543]
ESC	3.39	0.705	3.54	0.635	1.222	.516	.032	0.222	[0.057; 0.387]
FSC	4.69	0.317	4.60	0.301	1.304	.254	.028	0.290	[0.125; 0.456]
PSC	4.29	0.535	4.02	0.509	3.196	.658	.000	0.515	[0.348; 0.683]
BMI	17.80	2.158	18.46	2.654	31.256	.000	.000	0.277	[0.111; 0.442]
MDA	28.55	2.037	27.74	1.681	23.397	.000	.000	0.428	[0.262; 0.595]
PUVG	22.58	6.909	21.00	3.726	27.088	.000	.000	0.274	[0.109; 0.440]

Note 1: Hours of Daily Physical Activity (HDPA), Hours of Daily Screen Use (HDSU), Hours of Daily Sleep (HDS), Academic Self-Concept (ASC), Social Self-Concept (SSC), Emotional Self-Concept (ESC), Family Self-Concept (FSC), Physical Self-Concept (PSC), Body Mass Index (BMI), Mediterranean Diet Adherence (MDA), Problematic Use of Video Games (PUVG).

Table 2 shows the correlation values between variables as a function of male participants. Age was positively related to HDPA (r = .146) and PUVG (r = .453) while it was negatively related to HDS (r = -.260). Hours of daily physical activity were indirectly associated with HDS (r = -.125), HDSU (r = -.202), and PUVG (r = -.246), and these variables were directly associated with MDA (r = .121), ASC (r= .242), SSC (r = .334), and PSC (r = .420). Daily use of digital screens correlated negatively with ASC (r = -.116), PSC (r = -.160), FSC (r = -.315) and HDSU (r = -.346), while positively with SSC (r = .326) and PUVG (r = .416). Daily sleep time was directly associated with ASC (r = .242), FSC (r = .263) and ESC (r = .273) and indirectly with SSC (r = -.269) and PUVG (r = -.435). For the dimensions of the self-concept, a direct relationship between ASC and

MDA (r = .149) and indirectly with PUVG (r = -.368) was highlighted. The same occurred between the SSC with MDA (r = .232) and PUVG (r = -.268), FSC with MDA (r = .528) and PUVG (r = -.142) and PSC with MDA (r = .248) and PUVG (r = -.142). Also, ESC was negatively correlated with PUVG (r = -.305). Finally, it was noted that MDA and PUVG had a negative mean strength ratio (r = -.427).

Table 2. Correlation of study variables according to the male gender.

	HDPA	**HDSU**	**HDS**	**ASC**	**SSC**	**ESC**	**FSC**	**PSC**	**MDA**	**PUVG**
Age	.146*	.057	-.260**	.090	.068	.001	.045	.063	.059	.453**
HDPA	-	-.202**	-.125*	.242**	.334**	.051	-.093	.420**	.121*	-.246**
HDSU		-	-.346**	-.116*	.326**	-.038	-.315**	-.160*	-.457**	.416**
HDS			-	.242**	-.269**	.273**	.263**	.099	-.057	-.435**
ASC				-	.325**	.454**	.472**	.608**	.149*	-.368**
SSC					-	.421**	-.159*	.497**	.232**	-.268**
ESC						-	.181*	.437**	-.094	-.305**
FSC							-	.202**	.528**	-.142*
PSC								-	.248**	-.520**
MDA									-	-.427**
PUVG										-

Note 1: Hours of Daily Physical Activity (HDPA), Hours of Daily Screen Use (HDSU), Hours of Daily Sleep (HDS), Academic Self-Concept (ASC), Social Self-Concept (SSC), Emotional Self-Concept (ESC), Family Self-Concept (FSC), Physical Self-Concept (PSC), Mediterranean Diet Adherence (MDA), Problematic Use of Video Games (PUVG).

Table 3. Correlation of study variables according to the female gender.

	HDPA	**HDSU**	**HDS**	**ASC**	**SSC**	**ESC**	**FSC**	**PSC**	**MDA**	**PUVG**
Age	.379**	.302**	.069	.074	-.362**	.352**	-.520**	-.079	.352**	-.434**
HDPA	-	-.328**	-.119	.401**	.088	.229**	-.244**	.326**	.151*	.082
HDSU		-	-.181*	-.455**	.073	-.348**	-.343**	-.388**	-.288**	.033
HDS			-	-.118	-.351**	-.056	.396**	.034	-.054	-.088
ASC				-	.513**	.387**	.432**	.375**	.409**	-.347**
SSC					-	-.020	-.179*	-.066	.247**	-.236**
ESC						-	.046	.481**	.236**	.279**
FSC							-	.237**	.034	-.397**
PSC								-	.260**	-.495**
MDA									-	-.416**
PUVG										-

Note 1: Hours of Daily Physical Activity (HDPA), Hours of Daily Screen Use (HDSU), Hours of Daily Sleep (HDS), Academic Self-Concept (ASC), Social Self-Concept (SSC), Emotional Self-Concept (ESC), Family Self-Concept (FSC), Physical Self-Concept (PSC), Mediterranean Diet Adherence (MDA), Problematic Use of Video Games (PUVG).

Table 3 shows the correlation values between variables as a function of female participants. Age was positively associated with HDSU (r = .302), ESC (r = .352), MDA (r = .352) and HDPA (r = .379), while negatively with SSC (r = -.362), PUVG (r = -.434) and FSC (r = -.520). Hours of daily physical activity were directly related to MDA (r = .151), ESC (r = .229) and PSC (r = .326), while indirectly related to FSC (r = -.244) and HDSU (r = -.328). A negative and indirect association was found between daily use of digital screens and HDSU (r = -.181), MDA (r = -.288), FSC (r = -.343), ESC (r = -.348), PSC (r = -.388) and ASC (r = -.455). For daily sleep hours, a direct relationship with FSC (r = .396) and an indirect relationship with SSC (r = -.351) were observed. For self-concept dimensions, a positive relationship between SSC (r = .236), SSC

(r = .247), PSC (r = .260) and ASC (r = .409) with MDA and a negative relationship between SSC (r = -.236), ASC (r = -.347), FSC (r = -.397) and PSC (r = -.495) with PUVG were reported. There was also a direct correlation between SSC (r = .279) and PUVG. Finally, the MDA correlated negatively with the PUVG (r = -.416).

DISCUSSION AND CONCLUSION

This study aims to establish a current perspective on gender differences in physical-healthy habits and psychosocial aspects in primary education students. At this same stage and with a current perspective, studies of similar nature were found for the treatment of sedentary behaviours, perception of physical activity and sleep hours (Aguilar-Farias, Martino-Fuentealba and Chandia-Poblete, 2020; Amigo, Peña, Errasti and Busto, 2016; Martínez-Martínez, Aznar, González-Víllora and López-Sánchez, 2019; McGovern, Drewson, Hope and Konopack, 2020), video game use and internet addiction, quality of life and eating habits (Choi, Cho, Lee, Kim and Park, 2018; Leng, Phua and Yang, 2019; Tzischinsky, 2016), as well as the treatment of self-concept (Ehm, Hasselhorn and Schmiedek, 2019; Sánchez-Miguel et al., 2020).

Male children showed greater incidence in the practice of physical-sports activity, as well as for the problematic use of video games. In contrast, the female gender registered a greater number of hours and use of digital screens. Evidence supported by the study developed by McGovern, Drewson, Hope and Konopack (2020) and Virginia-Anaez, Fornieles-Deu and Sánchez-Carracedo (2020), which found that boys tend to practice more physical activity due to factors such as competitiveness. However, Farooq et al. (2017) suggested that for physical activity to be more motivating for women it should incorporate cooperative play, improved perceived self-efficacy and social interaction (Dowda, Taverno-Ross, McIver, Dishman and Pate, 2017). In fact, from these results we could extract the idea that while boys prefer to go out for physical and recreational activities, girls prefer activities related to watching TV, use of computers, tablets and mobiles.

In line with this, the girls had higher body mass indexes. It is true that one of the limitations of this body composition indicator is that it does not differentiate between percentage of fat, mass, water or mineral mass, but it is admitted as an adequate indicator when carried out on large samples of young people (Martínez-López, Suárez-Manzano, De la Torre-Cruz and Ruiz-Ariza, 2019). Women tend to have higher levels of body mass index due to their natural composition (Ramos-Valverde, Rivera-De los Santos and Moreno-Rodríguez, 2010). In this case, young women who were more sedentary showed higher levels of body weight (Miravalls et al. 2020).

Likewise, the men obtained better values for the adherence to an adequate diet such as the Mediterranean one. Thus, it has been shown that the practice of physical activity is directly related to an adequate diet and body care (García-Cabrera et al., 2015; Santos-Labrador, 2018). However, in the research developed by Tapia-López (2019), it was found that, although it is men who practice more physical activity, they do not have an adequate level of compliance with the Mediterranean diet.

Thus, the female gender revealed better results for the subjective perception of academic, social and emotional self-concept. While the male did so in the physical and family self-concept. These data are supported by those obtained in the study by Herrera, Al-Lal and Mohamed (2020), which point out that these differences are due to the fact that girls attribute their achievements to effort and perseverance, while boys do it to their abilities (English et al., 2012). However, Xie, Xin, Chem and Zhang (2019) highlighted that it is boys who show higher levels of emotional self-concept and self-esteem, an effect derived from increased

physical activity, which provides them with the mechanisms and tools to deal effectively with stressful situations.

In relation to the age of the male participants, it was shown that increasing age is directly associated with increased practice of physical-sports activity and problematic use of video games, while sleeping hours decrease. In this sense, Miskoff, Chaudhri and Miskoff (2019), showed that young people abuse video games, which has a negative impact on the hours and latency of sleep, which will trigger adverse health, cognitive, physical and behavioural effects, in addition to an increase in drowsiness and self-perceived fatigue (Peracchia and Curcio, 2018).

Although the same was true for the female participants in terms of physical-sports activity, increasing age was associated with greater use of digital screens, better diet and emotional self-concept, while family and social self-concept and problematic use of video games decreased. Similar data to those found in the research by González-Valero et al. (2018), which confirm that this may be due to the fact that the acquisition of healthy habits such as the practice of physical activity is associated with better dietary levels and thus with the appropriate use of screen time (Hong et al., 2018; Singh, 2019).

In the boys, a greater number of hours of physical activity per week was related to a decrease in the problematic use of video games, hours in front of digital screens and hours of sleep. While adherence to the Mediterranean diet, academic, social and physical self-concept increased. In this sense, the study by Cha et al. (2018), states that the practice of physical activity is associated with a lower use of digital screens, since there is a tendency to occupy free time through exercise. With regard to levels of self-concept, Grao-Cruces, Fernández-Martínez and Nuviala (2017), point out that the practice of physical activity acts as an enabler, which means that both the social and physical factors increase due to the interactions that the practice of physical activity entails, as well as the changes at the physical level that it produces (Clevinger, Petrie, Martin and Greenleaf, 2020).

Similar results were observed in girls, although physical activity was associated with lower levels of family self-concept. These data are supported by the findings of Amando-Alonso, Mendo-Lazaro, Leon-Del Barco, Mirabel-Alviz and Iglesias-Gallego (2018), which suggest that the practice of regular physical activity in females may be beneficial for family self-concept, but only up to a certain frequency of practice, which in turn responds to the fact that women tend to give greater relevance to family aspects than to exercise.

Subjects who make greater use of digital screens are associated with less sleep and worse academic, physical and family self-perception. Studies such as Choi et at. (2018) showed that poor academic performance and low levels of exercise were associated with abusive Internet use. Thus, the time that adolescents spend in front of digital technologies (TV, mobile phones, computers and tablets), has raised a concern since an abusive use may be negatively associated with physical-mental well-being (Knebel et al., 2020; Przybylski and Weinstein, 2017; Przybylski and Weinstein, 2019). Likewise, screen time has also been associated with poorer sleep outcomes in young children and school children (Janssen et al., 2019). In girls it was also associated with a worse diet, although there are studies such as Lyngdoh, Akoijam, Agui and Singh (2019) where no difference was found between screen use and diet type. While in children, this use of digital screens leads to more problems with video games and improves social self-concept. Time spent watching television was associated with friendship and self-esteem (Braig et al., 2018).

In school age, Paruthi et al. (2016) recommend that sleep time should be between nine and 12 hours. Based on this and for both genders, a higher number of sleep hours was associated with better academic, family

and emotional self-concept, reducing social self-concept and problems with video games. Based on this, negative associations between physical self-concept and dream behaviour have been demonstrated (Hausberger, Pollak and Tran, 2016). In relation to these results, sleep quality was positively related to mental health and negatively to the intensity of video games, this being an important factor in sleep quality (Altintas, Karaca, Hullaert and Tassi, 2019; Yabe et al., 2018).

An adequate adherence to the Mediterranean diet improves the perception of academic, social, physical and emotional self-concept. In contrast, a worse diet is related to a more problematic use of video games in both cases. Compliance with recommendations on the consumption of protein-rich foods was associated with higher academic performance compared to students who did not comply with them (Faught et al., 2019). Likewise, adherence to the Mediterranean diet was related to academic level and self-concept, age and social self-concept (Onetti, Alvarez-Kurogi and Castillo-Rodríguez, 2019).

Finally, as the main conclusions of the study, it should be noted that men have higher levels of regular physical activity, problematic use of video games, adherence to the Mediterranean diet and physical and family self-concept. While females show higher levels of body mass index and academic, social and emotional self-concept. Likewise, the boys showed that greater participation in physical-sports activities was associated with better adherence to the Mediterranean diet, levels of self-concept and fewer hours of sleep. In this sense, it should be noted that the girls showed that the greater the practice of physical activity the lower the family self-concept. In addition, it was found that, in general, an adequate intake of the Mediterranean diet favours self-concept, while when this is low, the use of problematic video games is encouraged.

With regard to limitations, it should be noted that this is a cross-sectional study, which makes it possible to have data from a sample at a given time. Similarly, the sample is not sufficiently representative to be able to make generalisations. Moreover, since they are schoolchildren, the various healthy or unhealthy habits they display depend on their families, since they do not yet have the autonomy needed to make decisions about their lifestyle. As a future perspective, it is necessary to emphasize that it is necessary to develop intervention programs in order to promote and inculcate healthy habits from an early age. It is also necessary to expand the study population to obtain a representative sample.

AUTHOR CONTRIBUTIONS

Conceptualization: Gabriel González-Valero (G.G.V.), Silvia San Román-Mata (S.S.R.M.), José Luis Ubago-Jiménez (J.L.U.J.) and Pilar Puertas-Molero (P.P.M.). Methodology: G.G.V., P.P.M. and S.S.R.M. Software, G.G.V. and S.S.R.M. Formal analysis, G.G.V., J.L.U.J. and P.P.M. Investigation, G.G.V., S.S.R.M., J.L.U.J. and P.P.M. Data curation, G.G.V. Writing—original draft preparation, G.G.V. and P.P.M.; writing—review and editing, G.G.V., S.S.R.M., J.L.U.J. and P.P.M. Supervision, G.G.V. All authors have read and agreed to the published version of the manuscript.

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